

**OYSTER WORLD CONGRESS 2012**  
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**Biosecurity Measures for OsHV-1  
Control at Cawthron Aquaculture  
Park:  
Key to Recovery of New Zealand's  
Pacific Oyster Industry**

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## NZ Pacific Oyster Industry

- Third biggest aquaculture earner in NZ (2,500 t/ annum) mainly export market
- Traditionally, industry based on wild caught spat on sticks
- Sticks moved from spat catching areas to North Island harbours for grow-out
- Takes 12-18 months to market
- Gradual shift towards hatchery single seed over past years to take advantage of:
  - Genetic gains from selective breeding
  - Triploids
- Before OsHV-1, >70% of NZ production still based on wild caught spat



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## OsHV-1 $\mu$ -var: Farm impact & spat source

- OsHV-1: first mortalities in April 2010, but only confirmed in Nov 2010
- All main oyster growing areas on North Island affected: 90% mortality in juveniles, larger oysters less!
- Wild and hatchery spat equally affected on North Island
- OsHV-1 spread with wild spat (Kaipara H. = main catching area) and stock movements between harbours
- No OsHV-1 mortality on South Island
- Spat source for South Island:
  - Local caught spat
  - Predominantly: hatchery spat



## OsHV-1: Catalyst for major changes in New Zealand industry

Towards more **farm specialization**:

- Use of OsHV-1 free **hatchery spat**
- **Intermediate grow-out** of hatchery spat on non-affected ***South Island*** farms, deep water
- **Final grow-out & fattening** on ***North Island*** farms, inter-tidal, during OsHV-1 low risk season (colder water temp.)



**Timing is critical for success!**

# Towards more production specialization



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## Industry moving towards hatchery spat:

- Reliable source of spat, OsHV-1 free
- Available at desired time (different from wild caught)
- Benefits from selective breeding for OsHV-1 resilience & other traits
- Triploids (3N):
  - Critical for production timing!
  - CAW's 'Instant 3N' technology requires no 4N step; genetic gains from selective breeding immediately passed on to commercial gains



Cawthron: NZ's supplier of hatchery spat



## What is Cawthron?

- Independent, non-profit research institute
- 180 staff
- Focus:
  - Aquaculture production
  - Coastal and freshwater ecosystems
  - Aquatic biotechnology
  - Seafood Safety
  - Analytical services



## Cawthron relationships with oyster industry

- Selective breeding (14 years) partnership with industry (i.e. PMF): first success with OsHV-1 resilience
- Supplier of triploid oyster spat - industry driven
- OsHV-1 research
- Industry training in hatchery single seed oyster cultivation (CAW/ Waiheke Fresh Seafood)
- Seafood safety: algae monitoring & bio-toxin (LCMS) testing



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## Cawthron Aquaculture Park

- 15 ha site with pristine sea waters, 10 minutes out of Nelson
- For research, commercial & educational activities
- Current tenants:
  - Cawthron Glenhaven Aquaculture Centre: shellfish research
  - Commercial oyster spat operation
  - SpatNZ: commercial mussel hatchery
  - NMIT – education: Diploma in Aquaculture



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## Objectives of biosecurity measures for OsHV-1 at Cawthron Aquaculture Park

- Permit sourcing of broodstock from North Island infected farms for selective breeding & commercial spat production
- Avoid virus loading of Tasman Bay/ South Island environment
- Provide OsHV-1 PCR free tested spat for intermediate grow-out to South Island farms
- QA for Cawthron Aquaculture Park tenants



# Pacific oyster facilities at Cawthron Aquaculture Park

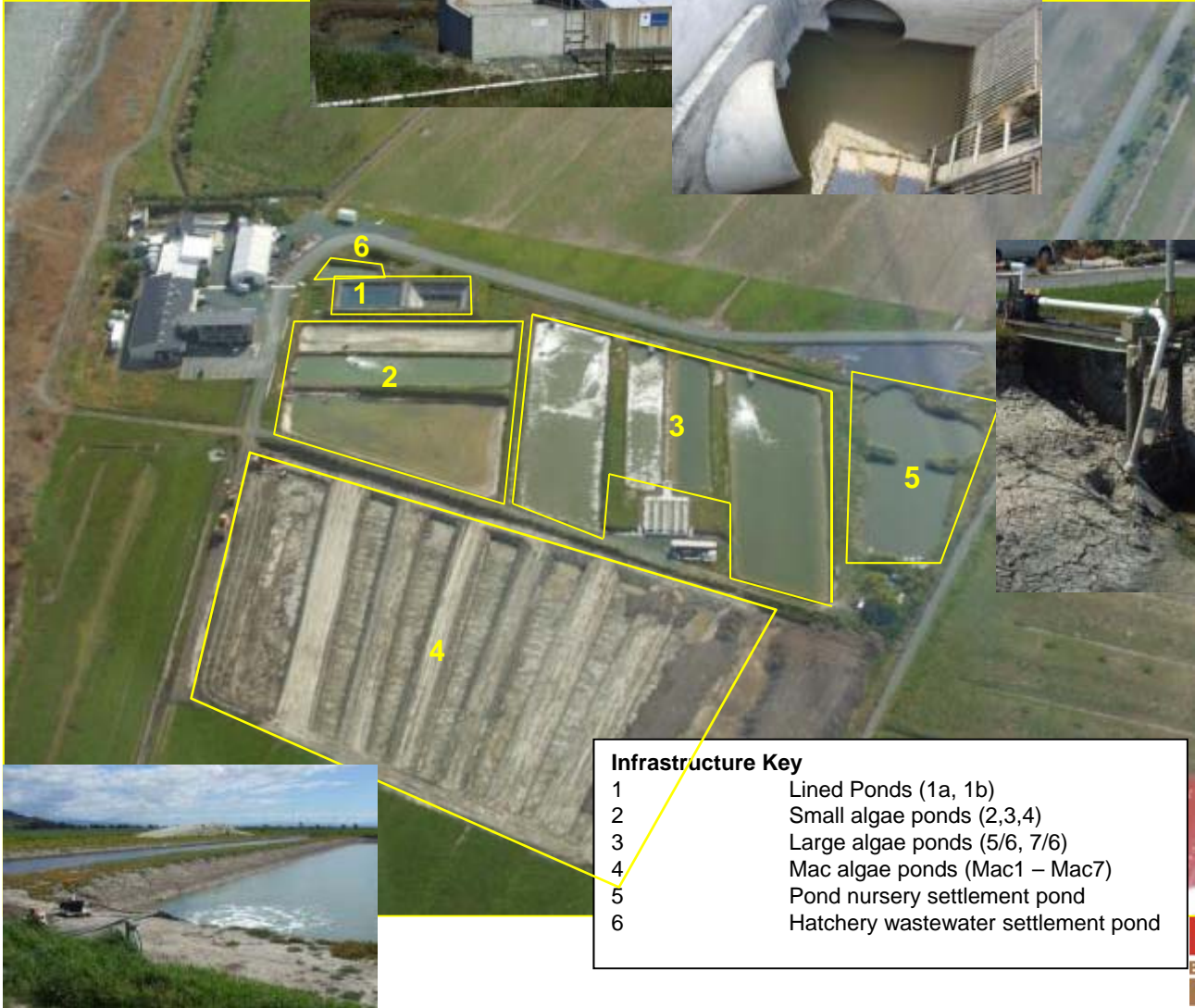
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## Measures taken to control OsHV-1

- Research into pathways of OsHV-1 infection: horizontal transfer, no vertical!
- Specific biosecurity measures, for:
  - Broodstock holding/conditioning
  - Hatchery operation: larval rearing & spat micro-nursery
  - Spat nursery: shed nursery & outdoor nursery, both pond-based
- Standard Operation Procedures (SOPS) developed in collaboration with Ministry of Primary Industries (MPI):
  - Monitoring and management of oyster health & diseases
  - Stock, staff, equipment & other material movements and management

# Water supply/ discharge infrastructures at CAP: potential entry points for OsHV-1 ...



Infrastructure Key	
1	Lined Ponds (1a, 1b)
2	Small algae ponds (2,3,4)
3	Large algae ponds (5/6, 7/6)
4	Mac algae ponds (Mac1 – Mac7)
5	Pond nursery settlement pond
6	Hatchery wastewater settlement pond

## Biosecurity measures: broodstock

- Temporary quarantine station set up in container
- Broodstock holding capacity for 1200 oysters
- All broodstock, also from SI, treated as OsHV-1 positive
- Effluent treatment: both chlorination and UV



## Biosecurity measure hatchery: larval rearing & micro-nursery

- 1  $\mu\text{m}$  filtration & UV sterilization of incoming water
- Chlorination & UV treatment of all effluent water
- Close larval/spat health monitoring
- OsHV-1 testing: by independent accredited laboratory
  - Unusual mortality
  - Each batch before leaving hatchery!



## Biosecurity measures nursery systems

- Potential entry pathways for OsHV-1:
  - **Spat source**: no risk, as only negative tested moved on
  - **Water source** (non-treated): potential risk by feral oysters
- Use of **closed pond system**: water recirculated for up to 2 weeks
- **Two-pond system**: regular pond changes
- Food supply via 7 separate **algae ponds**
- Partial water exchange of 10-20%/day with “aged” sea water via algae ponds





## Biosecurity pond-nursery system continued ...

Benefits of **two pond nursery system**:

- OsHV-1 control: **water ageing** for 4 days before use on spat (for algae & nursery ponds)
- Regular **pond drying**: UV treatment (sunshine!) of pond sediments, improved pond hygiene & water quality management
- **Stirring of pond sediments** during filling: precautionary measure to control OsHV-1 ... effective?

**Spat certification**: all oyster batches tested independently for OsHV-1 by independent laboratory



## Other oyster health and environmental monitoring

### Water quality:

- Temp, DO, Chl. A, pH
- Algae species
- Nutrients (P, N, Si)
- **Filtration rate!**

### Shellfish health:

- Spat performance (growth, mortality, condition, etc.)
- Spat hardening & fitness: regular drying periods

### Histology & PCR every 6 months of 150-200 random oysters:

- None of OIE listed diseases
- OsHV-1 testing (PCR & ISH) since incident in 2010



## Biosecurity measures at C.A.P.: key factor for industry's OsHV-1 recovery plan

- Resumed:
  - **selective breeding** in Nov 2011: 60 seed lots (>1850 families ) with promising results
  - **commercial spat production** in Oct 2011,
  - **first commercial spat (100% 3N) selected for OsHV-1 resilience** in Oct 2012
- Since Nov 2010: >100 oyster batches produced: no further positive OsHV-1 test result at C.A.P. (larvae or spat)
- Hatchery spat becoming primary source of spat in NZ: 70% of prod. by 2013/14?



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